

# PSLV-C36

## RESOURCESAT-2A

# PSLV-C36



PSLV-C36 at the First Launch Pad

PSLV-C36 is the thirty eighth flight of ISRO's Polar Satellite Launch Vehicle (PSLV). In this flight, the 'XL' version of PSLV with six solid strap-on motors is used.

PSLV-C36 will place the 1235 kg RESOURCESAT-2A into an 827 km polar Sun Synchronous Orbit (SSO). PSLV-C36 will be launched from the First Launch Pad (FLP) at Satish Dhawan Space Centre SHAR, Sriharikota.

PSLV is the ISRO's versatile launch vehicle for launching multiple satellites in polar SSOs, Low Earth Orbits (LEO) as well as Geosynchronous Transfer Orbit (GTO) and sub GTO. With 36 successful launches, PSLV has emerged as the workhorse launch vehicle of ISRO and is offered for launching satellites for international customers. During 1994-2016 period, PSLV has successfully launched a total of 121 satellites, of which 79 satellites are from abroad and 42 are Indian satellites.

## PSLV-C36 at a glance (Vehicle lift-off Mass: 321 tonne Height: 44.4 m)

	Stage-1	Stage-2	Stage-3	Stage-4
Nomenclature	Core Stage PS1 + 6 Strap-on Motors	PS2	PS3	PS4
Propellant	Solid (HTPB based)	Liquid (UH25 + N <sub>2</sub> O <sub>4</sub> )	Solid (HTPB based)	Liquid (MMH + MON-3)
Propellant Mass(T)	138.2 (Core), 6 x 12.2 (Strap-on)	41.7	7.65	2.5
Stage Dia (m)	2.8 (Core), 1 (Strap-on)	2.8	2.0	1.4
Stage Length (m)	20 (Core), 12 (Strap-on)	12.8	3.6	3.0

HTPB : Hydroxyl Terminated Poly Butadiene

UH25 : Unsymmetrical Dimethyl Hydrazine + 25% Hydrazine Hydrate

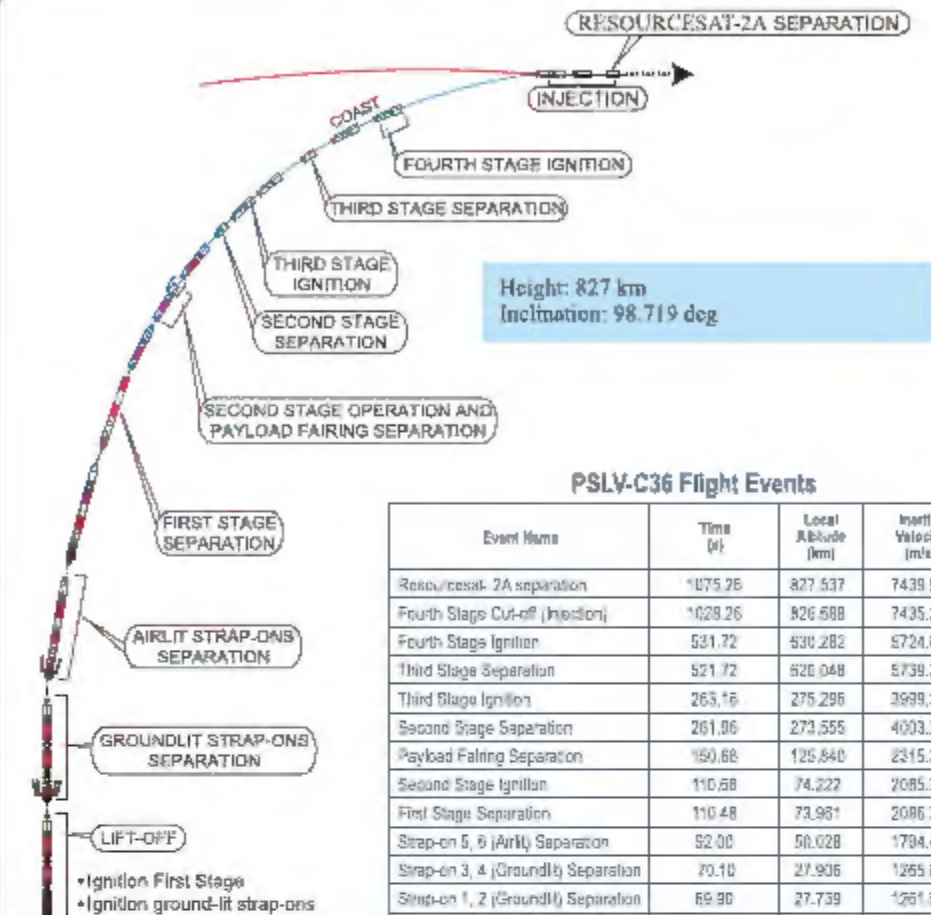
N<sub>2</sub>O<sub>4</sub> : Nitrogen Tetroxide

MMH : Mono Methyl Hydrazine, MON-3: Mixed Oxides of Nitrogen

# PSLV-C36



RESOURCESAT-2A in PSLV-C36 Envelope



PSLV-C36 Flight Events

Event Name	Time (s)	Local Altitude (km)	Inertial Velocity (m/s)
Resourcesat-2A separation	1075.26	827.537	7439.93
Fourth Stage Cut-off (Injection)	1028.26	826.588	7435.28
Fourth Stage Ignition	521.72	530.282	5724.87
Third Stage Separation	521.72	520.048	5739.37
Third Stage Ignition	263.16	275.296	3999.31
Second Stage Separation	261.06	273.555	4003.24
Payload Fairing Separation	150.68	125.640	2315.30
Second Stage Ignition	110.68	74.222	2085.32
First Stage Separation	110.48	73.961	2086.34
Strap-on 5, 6 (Airlit) Separation	52.00	58.028	1794.43
Strap-on 3, 4 (Groundlit) Separation	70.10	27.906	1265.85
Strap-on 1, 2 (Groundlit) Separation	69.90	27.739	1261.55
Strap-on 5, 6 (Airlit) Ignition	25.0	2.742	563.32
Strap-on 3, 4 (Groundlit) Ignition	0.62	0.024	451.89
Strap-on 1, 2 (Groundlit) Ignition	0.42	0.024	451.89
First Stage Ignition	0.00	0.024	451.89

PSLV-C36 Typical Flight Profile



Hoisting of a segment of PSLV-C36 core stage during vehicle integration



PSLV-C36 second stage (liquid) at Stage Processing Facility

# RESOURCESAT-2A

RESOURCESAT-2A is a Remote Sensing satellite intended for resource monitoring, built by ISRO. RESOURCESAT-2A is a follow on mission to RESOURCESAT-1 and RESOURCESAT-2, launched in 2003 and 2011 respectively. RESOURCESAT-2A is intended to continue the remote sensing data services to global users provided by RESOURCESAT-1 and RESOURCESAT-2

RESOURCESAT-2A carries three payloads which are similar to those of RESOURCESAT-1 and RESOURCESAT-2. They are a high resolution Linear Imaging Self Scanner (LISS-4) camera operating in three spectral bands in the Visible and Near Infrared Region (VNIR) with

5.8 metre spatial resolution and steerable up to  $\pm 26$  deg across track to achieve a five day revisit capability. The second payload is the medium resolution LISS-3 camera operating in three-spectral bands in VNIR and one in Short Wave Infrared (SWIR) band with 23.5 metre spatial resolution. The third payload is a coarse resolution Advanced Wide Field Sensor (AWiFS) camera operating in three spectral bands in VNIR and one band in SWIR with 56 metre spatial resolution.

RESOURCESAT-2A carries two Solid State Recorders with a capacity of 200 Giga Bits each to store the images taken by its cameras which can be read out later to ground stations.



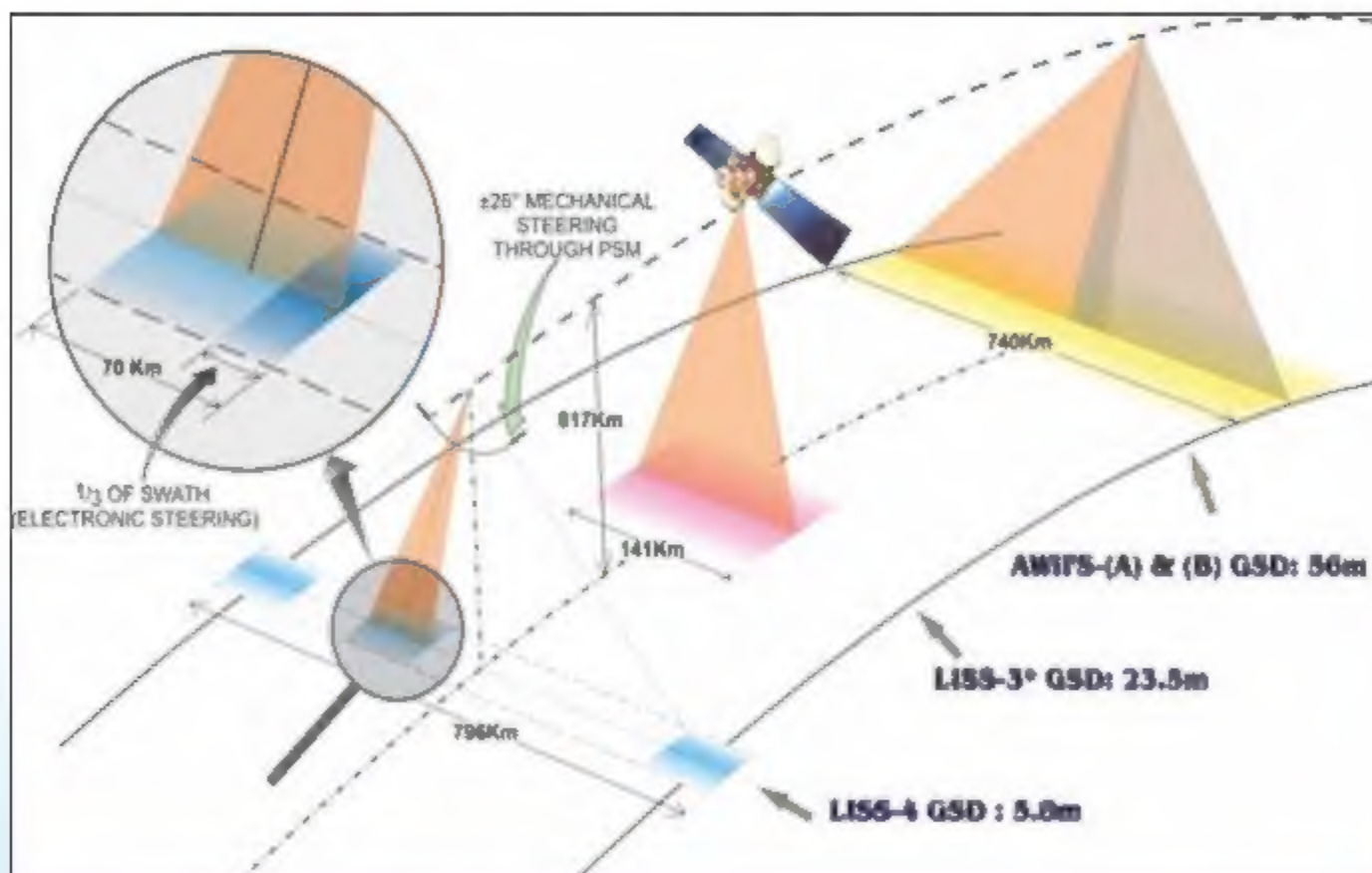
RESOURCESAT-2A in clean room before its launch

## Salient Features

Orbit	Circular Polar Sun Synchronous
Orbit height	817 km
Orbit inclination	98.719 deg.
Orbit Period	101.35 min
Number of Orbits per day	14
Local Time of Equator crossing	10.30 AM
Repetivity	24 days
Lift-off Mass	1235 kg
Attitude and Orbit Control	3-axis body stabilised using Reaction Wheels, Magnetic Torquers and Hydrazine Thrusters
Power	Solar Array generating 1700 W at End of Life, two 24 AH Ni-Cd batteries
Mission Life	5 years

## Three Tier Imaging System of RESOURCESAT-2A

RESOURCESAT series of satellites have a unique 3-Tier imaging system with AWiFS, LISS-3 and LISS-4 sensors. The Advanced Wide Field Sensor (AWiFS) provides images with a resolution of 56 m in 4 bands, has a swath of 740 km and a revisit of 5 days whereas the Linear Imaging Self Scanning Sensor (LISS) -3 provides 23.5 m resolution images in 4 bands with 141 km swath and a repetitivity of 24 days. LISS-4 provides 5.8 m resolution images in 3 bands with 70 km swath and has a revisit of 5 days. These multispectral cameras have linear arrays of Charged Coupled Devices (CCDs) as detectors working in push-broom scanning mode.



## RESOURCESAT-2A Payload Specifications

Payload	LISS-4	LISS-3	AWiFS
Spatial Resolution (m)	5.8	23.5	56
Swath (km)	70.0 in MX mode and Mono mode	141	740
Spectral Band (microns)	0.52-0.59 0.62-0.68 0.77-0.86	0.52-0.59 0.62-0.68 0.77-0.86 1.55-1.70	0.52-0.59 0.62-0.68 0.77-0.86 1.55-1.70
Quantisation (bits)	10	10	12 (VNIR) 14 (SWIR)
Data Rate (MBPS)	105	105	105

# INDIAN SATELLITES CARRIED ONBOARD PSLV

Sl. No.	Satellite	Launch Date	Mission
01	IRS-1E*	20.09.1993	PSLV-D1
02	IRS-P2	15.10.1994	PSLV-D2
03	IRS-P3	21.03.1996	PSLV-D3
04	IRS-1D	29.09.1997	PSLV-C1
05	Oceansat(IRS-P4)	26.05.1999	PSLV-C2
06	Technology Experiment Satellite (TES)	22.10.2001	PSLV-C3
07	KALPANA-1(METSAT)	12.09.2002	PSLV-C4
08	Resourcesat-1(IRS-P6)	17.10.2003	PSLV-C5
09	CARTOSAT-1	05.05.2005	PSLV-C6
10	HAMSAT	05.05.2005	PSLV-C6
11	CARTOSAT-2	10.01.2007	PSLV-C7
12	SRE-1	10.01.2007	PSLV-C7
13	CARTOSAT - 2A	28.04.2008	PSLV-C9
14	IMS-1	28.04.2008	PSLV-C9
15	Chandrayaan-1	22.10.2008	PSLV-C11
16	RISAT-2	20.04.2009	PSLV-C12
17	ANUSAT	20.04.2009	PSLV-C12
18	Oceansat-2	23.09.2009	PSLV-C14
19	CARTOSAT-2B	12.07.2010	PSLV-C15
20	STUDSAT	12.07.2010	PSLV-C15
21	RESOURCESAT-2	20.04.2011	PSLV-C16
22	YOUTHSAT	20.04.2011	PSLV-C16
23	GSAT-12	15.07.2011	PSLV-C17
24	Megha-Tropiques	12.10.2011	PSLV-C18
25	SRMSAT	12.10.2011	PSLV-C18
26	Jugnu	12.10.2011	PSLV-C18
27	RISAT-1	26.04.2012	PSLV-C19
28	SARAL	25.02.2013	PSLV-C20
29	IRNSS-1A	01.07.2013	PSLV-C22
30	MOM Spacecraft	05.11.2013	PSLV-C25
31	IRNSS-1B	04.04.2014	PSLV-C24
32	IRNSS-1C	16.10.2014	PSLV-C26
33	IRNSS-1D	28.03.2015	PSLV-C27
34	ASTROSAT	28.09.2015	PSLV-C30
35	IRNSS-1E	20.01.2016	PSLV-C31
36	IRNSS-1F	10.03.2016	PSLV-C32
37	IRNSS-1G	28.04.2016	PSLV-C33
38	Cartosat-2 Series Satellite	22.06.2016	PSLV-C34
39	SatyabhamaSat	22.06.2016	PSLV-C34
40	Swayam	22.06.2016	PSLV-C34
41	Scatsat-1	26.09.2016	PSLV-C35
42	Pratham	26.09.2016	PSLV-C35
43	PISAT	26.09.2016	PSLV-C35

\* The Satellite could not be placed in orbit.



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